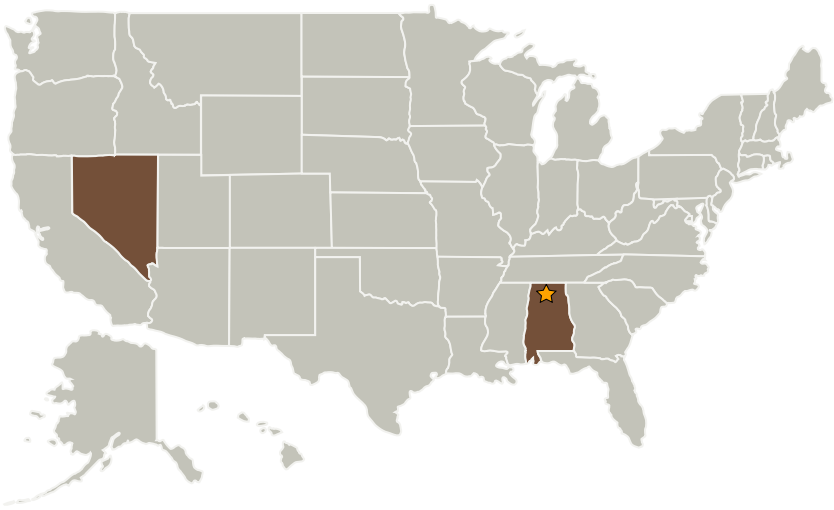
Triaxial Swirler Liquid Injector Development, Phase II

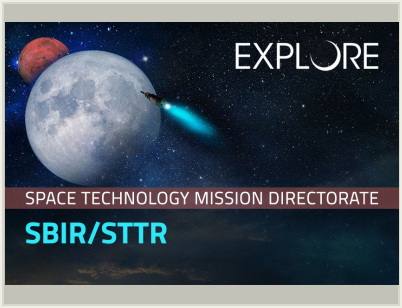
Completed Technology Project (2005 - 2007)

Project Introduction

Sierra Engineering Inc. (Sierra) believes that the subject triaxial liquid propellant swirl injector has the potential to meet many of NASA's Earth-to-Orbit (ETO) propulsion systems goals. The triaxial swirl injector is ideally suited to a wide range of liquid oxidizers and fuels, including hydrogen and a wide range of hydrocarbons. It holds the potential of excellent high-frequency combustion stability characteristics and low injector production cost, similar to a pintle injector. Additionally, the triaxial swirl injector offers the potential for excellent injector and combustion chamber thermal compatibility and outstanding propellant atomization characteristics, both at levels far superior to a pintle injector. The triaxial injector concept is well suited to both main injector and preburner applications. The Phase I SBIR effort focused on understanding the influence design variables have on injector performance. We developed the mechanical design concept for a prototype injector. The proposed Phase II effort will complete the detailed design and analysis of the prototype injector. The test hardware will be fabricated and tested with several propellants. A preliminary design will be developed for a large-scale combustor.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Sierra Engineering, Inc.	Supporting Organization	Industry	Carson City, Nevada

Primary U.S. Work Locations	
Alabama	Nevada

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.6 Gels